VPP006 Why AI is the key to innovation with ByteLake

Daniel: Thanks gentlemen for coming to my podcast. First thing obviously, it's two of you, not just Marcin, so I'm really grateful that it's both of you. I will need to change some of the questions probably or adjust them slightly; so we have today Marcin Rojek and Mariusz Kolanko from ByteLake and on your website or in the social media somewhere we read that you specialize in different aspects of machine learning or AI or federated Learning and other highly sophisticated IT related themes and topics. I would like to ask you what's really behind these phrases. I would like you guys to introduce ByteLake to the audience and tell us a bit more about all the sophistication behind these themes.

ByteLake: Absolutely, thank you Daniel for inviting us to your podcast. We appreciate it and we are very happy to be a part and build the story together with you and, yeah, so regarding ByteLake. So as ByteLake we build intelligent devices and cognitive services that help our clients to analyse data like videos, pictures, texts. I simply answer the questions about what shapes, what patterns, what trends they have into data or in other cases just to process the natural language. For instance, we build software powered by neural networks which we custom make for every customer and this neural networks can analyze pictures taken by, for instance, drones to monitor development of forests. We also have cases where our teams use machine learning to extract data or extract information from scanned documents or emails to, eventually, automate various business processes. One example here is our product Brainello, which dramatically improves the performance of the finance teams. And we also are very active on the edge of innovation for super computing platforms or HPC, if you like, and for instance here our implementation of the core algorithms used for fluid and weather simulations is still the fastest in the world. We checked the latest scientific journals just yesterday and we have not been beaten there. So we are very proud of that and, actually, we are bringing those simulations to the FPGA world right now. We will be launching a product around later this year and previous implementations were, naturally, for CPU plus GPU architectures and

landed, for instance, on … supercomputer which was at that time top three. And the buzzwords you mentioned like machine learning, deep learning, federated learning are, you know, very popular buzzwords, especially recently. And they represent substantial amount of knowledge, research work and projects that stand behind them. And you will find all of these very well explained, in our case that is on our website, but in short. Machine learning and deep learning are techniques we use extensively when helping our clients process data to quickly answer questions like: Why something happened? What will likely happen? or Where in the video or a picture can I find shapes or bar codes or packages? This is very crucial for quality-check systems or for overall monitoring surveillance systems. And HPC stands for high-performance computing and this is all about running complex simulations on powerful machines that consist of tens of thousands of cores and consist of Intel CPUs, Nvidia GPUs, FPGAs from Intel or Xylinx and imagining solutions that would normally run a couple of months on those powerful machines, they can run in hours or in weeks. And federated learning, this one deserves a bit more explanation here, by the way, we will be showing it live at the upcoming Mobile World Congress together with Lenovo, so you're of course invited to come and see us in the booth, but in general, we observe that AI on edge or AI algorithms running directly on devices, if you like, are booming these days. Deployments like that allow us to process the data on the spot, in real time and without any need of sending them around back and forth. So think, for instance, of scenarios applicable for industry for DotZero where the connectivity is very limited, if available at all, so in the world of decentralized AI we produce many local models on all those distributed devices and with federated learning we can leverage on all of these and aggregate them and produce the model based on all of those local models to speed up the training process, that's in the first place, but to increase the accuracy of the model. So that's maybe a long story about ByteLake and where we stand in the AI world.

Daniel: Okay, so if someone would name one specific technological feature: would that be AI or there is something else which describes you better?

ByteLake: Yes, we as Byte Lake combine academia and business people and we specialize in AI which is quite a broad term. I consider ByteLake as machine and deep learning experts.

Daniel: Okay, so thanks for this very broad introduction. I was sort of expecting that it's going to be more complex than the question so hopefully it clarified it a bit, but we may need to dig into some of the details a bit later so the audience is more aware of, at least, one of the topics, but my main question right now for the introduction would be: is there be any space for you in the AI world which is dominated by all the big companies, all the big organizations like Google or Microsoft? That's super intriguing.

ByteLake: So of course, we are not big enough to serve all the clients. We work very closely with the big players like Microsoft and Lenovo, just to name a few, and we build products together and bring them to the market. Federated learning or Brainello are the best examples here.

Daniel: Okay, so could you please tell me, in that case, how big is ByteLake? Because on the website, I couldn't really figure out whether it's just two of you or maybe a whole team behind the business.

ByteLake: We are a team of eight people, people who are really close to the AI and the HPC world.

Daniel: Okay, congratulations then, congratulations, that's great.

ByteLake: Yeah, thank you.

Daniel: All right, so in that case, just to finish off the introduction, I would like to understand what is your vision actually for ByteLake, do you have any special secret plans for this year or what would you like to achieve in five years? And then we will move on to some more technical questions.

ByteLake: Of course. So we are building a company destinated to be known for delivering the impossible, not providing the outsourced teams, but a team delivering the AI and HPC solutions. We are right now bringing a few solutions to the market – one, of course, is Brainello. This is an engine that uses machine learning to extract data from the documents and another one is federated learning which is a game changer for intelligent devices and IoT. The third one, to be launched globally in the second half of the year is our set of ultra-optimized algorithms designed for fluid and weather simulation. So in five years time we would like to see those products succeed in the market globally.

Daniel: Okay, brilliant. I think I would like to listen a bit more about the last thing what you just said. I mean, I'm super intrigued and I'll tell you why – because I currently have been to Thailand and there was a tropical storm around there and I was actually in the middle of that storm. Is your solution helping in this kind of situations if maybe the weather is going really bad somewhere, is this the purpose of your algorithms for weather analysis or is it something else that I misunderstood?

ByteLake: Yes, so our engineers use many different scenarios. So what we provide is, before you start the real weather simulation you need to build a lot of underlying algorithms which are very much focused on mathematical simulations and these are a number of matrix operations which need to be computed along the way. And what we do – we optimize the whole algebra that is like a foundation for the simulations and, of course, our algorithms are then the basis for running micro-climate simulations and we are also discussing projects that are supposed to deliver local weather forecasts, so this is the context. And I believe this is very much applicable; under every weather simulation there are tons of algorithms that need to first process the data and the run sophisticated calculations in the background, so very much the case. Not yet in Thailand, but that's a good lead for us to fish in that market.

Daniel: Okay, understood. So do you take the measurements from some external devices or is it maybe historical data, how does it work then?

ByteLake: Yeah, so it works in a way that we work with real-time data, basically, and our algorithms mainly work with our clients' data, so for instance in the case of the Institute of Meteorology, they have a lot of data which then they process using our algorithms. So think of our algorithms as a framework.

Daniel: Okay, understood. So it's not necessarily this specific type of data.

ByteLake: It's not specifically attached to certain use cases. It's an engine that the guys like the Institute of Meteorology or some institutes in Thailand can use as a foundation and get a highly optimized engine from their simulations, much faster.

Daniel: Okay, that's great. All right, so we speak about, as you just mentioned, the buzzwords – AI, HPC, deep learning and everything, but give us some examples of AI-driven solutions used by ordinary companies. Probably one of the best examples would be Brainello.

ByteLake: Absolutely. So for instance, talking about Brainello. We deployed it in companies that specialize in EU fundings and accounting. So they use AI or actually machine learning without even knowing it. So our engine has been integrated into their ERP or work-flow systems and simply performs documents processing in the background – completely seamless task for operators and they just see the results. So think of a scenario in that particular case – they were processing invoices manually so they were getting scans from different sources like emails or folders in some sort drives, they had to read them thoroughly and extract the data manually and then insert them into ERP systems. What we did with Brainello – we just integrated our engine as part of their work-flow systems so the next time whenever they get new invoices through various channels Brainello is the first one that takes them, extracts the data and asks operators just for approval or maybe minor corrections, if they are needed. And the first feedbacks we got from clients is that

their finance team are able to work at least seven times faster. So that's just very tangible exercise and the result which makes the teams more efficient and this combines into a story that we call AI, so we don't necessarily translate it as artificial intelligence, we call it augmented intelligence, so that when you combine humans with all those augmented intelligent solutions, you actually become more efficient, you can do many additional tasks, avoid human errors along the way. Another example is a tool for a company that monitors trees planting and that's a very interesting case we're running as we speak. It works in a way that they upload images in 4K resolution taken by drones and our system can help them assess the amount of new trees and assess the tree survival rate, which is crucial for running their business and especially to monitor how the trees planting projects progress.

Daniel: Okay, that's very interesting. So in both cases then, was it driven by the customer who came to you and said: look, this is the problem we've got and we would like you to help us solve it or was it something you came up with and just made it happen with your team?

ByteLake: Yeah, so we have examples of both. In the first place we try to be proactive as much as possible so, for instance with the weather simulations optimized for FPGAs or GPUs – we approach certain customers and simply show them results we were able to do in the past on similar architectures and one thing led to another and we ended up having a case. For those cases with process optimization it started with a number of uniquely designed workshops with customers, so we started to help them explore the possibilities of AI to understand what they don't know – how AI can support them and lastly, we have some cases like the one with drones that the clients approached us and said: Hey, we have pictures like that, can you do the trees counting or whatever with your expertise here.

Daniel: It seems to me like companies in general may not even understand what AI is capable of, hence they don't even look for solutions like you provide. My feeling is that many could benefit, but they just don't know that maybe they need it or

maybe they don't know how to start. Do you have any comments on that, how we could potentially educate companies on using AI?

ByteLake: This is very true what you're saying. In our experience we discovered that many companies simply don't know what they don't know. That's why we run innovative workshops which we base on our experience wrapped around our unique formula to help them start and successfully go through the AI journey. So it usually starts with a question: what is the best AI project for a given company, where they should start, what technologies they should use, what's possible, what's not. We have really skilled researchers in our team as well, so they come with real-life examples, they bring research papers they've been working on and then we take it from there. It's just about helping clients translate the tech words into scenarios and use cases that work for them and are specially designed for their particular environments and that's what we've been doing. And we already have some successes in that so also on the Polish market, so at least some people in the world resonate with our way of running those projects.

Daniel: That's brilliant. I'm really happy for that and my question, actually, is about how a company which has maybe nothing to do with technology and they manufacture something and maybe there is one guy that understands that there is AI out there. What's the way for him to identify where to apply AI or where to apply technology like machine learning or deep learning in his specific job. How he identifies this?

ByteLake: This person needs to have a little bit of luck and meet ByteLake along the way somewhere in the process, but I would just explain it based on some real-life cases. So those people are usually educated well enough to, at least, pinpoint that AI is capable or have some gut feeling that AI can do certain things for them, and then, when we start collaborating with such companies, we start with innovation workshop, going through their processes, trying to understand how they work and at each and every point we simulate or we show them some of our case studies or attach them to some research paperwork explaining them: this is what

you can do in this place of your process. So for instance, if a company processes a lot of emails, they just need to answer certain questions, adjust to strict timelines – then we can point them to some solutions in natural language processing or show them some research papers that we did with some other customers and explain them: this is the reality you're facing right now, but have a look at this simulation – this is how your work might look like in the future and we translate it into ROI, we translate it into tangible savings either in time or man-hours. It's always a creative discussion from both ends.

Daniel: Okay, understood. Let's tackle the topic from a bit different angle then. We hear from tech world authorities, from time to time, that there are some hypothetical, but consequences of developing AI to certain level and I would like to understand what is your view on that, are we far away from problems where the AI is actually capable of doing something on its own, and maybe we could take this question also down to earth a bit and move it towards risk management, and how do you manage risk when implementing AI, so a bit of two questions.

ByteLake: Okay, so honestly saying, we need to think about risks from the positive and the negative aspects. From ByteLake perspective we are focusing on the positive aspects of the risks and AI has been very well summarized by recent report from McKinsey. They said that AI will contribute of around fourteen billions of US dollars to GDP. So imagine that that will translate into new jobs and better performance in many that we know today, so let's focus on that. We as a human race are more and more smart and we don't like to do the boring stuff.

Daniel: Yeah, I perfectly agree with you. If we can automate, then we can have time for other things, not necessarily leisure.

ByteLake: We are far from leisure, honestly. So think about AI as a revolution. In every revolution in industry we have a lot of risk, we have a lot of worries but still, after that it happened we have a lot of new jobs there. So think about, for example, computer revolution. Everybody were afraid that the computers would take the jobs

but let's look into world today – we have a lot of new jobs, a lot of new, smarter jobs. So think about it so like that.

Daniel: Have you ever been surprised that the solution, whether it was your idea or a client's problem to solve; have you ever been surprised if it worked better than expected? Is it actually possible to see this kind of results?

ByteLake: Yeah, of course. So let's take our recent work with this tree recognition. We delivered ninety-two to ninety-five percent accuracy, so drones moving fast and taking the picture, we are talking about 4K pictures and the drones are flying really high, so imagine the trees are really, really small and we were able to do it in such accuracy that it was really surprising for us.

Daniel: Okay that's brilliant. If you would summarize all your products or maybe all your solutions, which implementation you're the most proud of and tell us a bit more about it.

ByteLake: would say like a number of them, of course, product-wise or the ones which we are demoing right now that would be Brainello, the engine for invoices processing, and then the federated learning and quickly I will answer why. With Brainello we see really tangible results in the companies we're integrated into and federated learning places ByteLake at the edge of innovation, so this is completely new topic, there are hardly any research papers on that, a lot of is happening on that in the research space right now and we are all the part of it. The other one would be our frameworks for super computers and briefly why we're proud of it – so the most recent implementation of that is going to be launched on the technology which is around one month old. So we work really with the innovative stuff here and usually when our products keep the market, they are deployed on the most recent technologies available worldwide.

Daniel: That's great. So it seems like it places you in the top of innovators when it comes to AI. You've mentioned already that you work with Lenovo, are there any other companies you can talk about?

ByteLake: We will be launching the refreshed list soon, but right now we mainly worked with Lenovo which is our great and large partner, we do a lot of demos together for key events and WC is the upcoming one, we were at the International Supercomputing Conference, so we were in San Francisco together at the AI Summit and then the other company with which we are running a lot of joint marketing, and also customer cases, will be Microsoft. So this is the scale and more to launch soon. But these are the partners we work with mainly and in most areas.

Daniel: In that case I have a question whether it is the case that big companies they work with smaller teams, like yourselves, maybe around the world and that's their way to find innovation or that's their way to push the innovation forward not necessarily using their own resources, but why would they do that?

ByteLake: So it's different motivations. First of all, because we're great, that's ByteLake, so that's absolutely number one, but I would say that sometimes companies like that want to enter certain markets and there are either not there yet or they have different agenda and working with partners like ByteLake is for them very much about finding complementary offerings, complementary services – so that's one thing. The other one thing is that the those large companies – they are constantly fishing for new innovations and new solutions and if they find something interesting in the market somewhere, it doesn't matter whether you're small or big, they just want to work with you and share the great story together. They give you obviously access to lots of marketing opportunities, they give you access to their talents, you give them access to your talents and even if you are really smart you can still attract big players and our case is very much a good example of that. So yeah, working together, I believe it's a win-win solution for them. But even if you consider those companies, sometimes they come up with innovative ideas which are produced by a small team, so consider all the startups and small companies as small

teams that might become a part of those larger enterprises and it's just better if those small teams sometimes are external teams.

Daniel: How did you start then, what was the triggering point where you started working with Microsoft or Lenovo, because obviously you can't just call them and say: listen, we've got this thing and they will say: yes, yes work with us. So I'm sure that there was a process there and can you tell us a bit more about it. How did you start working with them?

ByteLake: We are pretty visible in the research space, in the AI and in the HPC, so that became interesting for some of our partners. For others – they saw our products like Brainello and they became interested in that, they saw some synergies that we could bring those products together to the market so I would say it's a mix of things, a bit of luck, you need to be visible with your activities in the market, but it all comes down to the point where those companies suddenly saw synergies either by combining our expertise with their teams or by leveraging our products and offering something new to their customers.

Daniel: Okay, that's great, I see. So basically, you've been active as researchers, you've been active as a small team with some ideas, some products and suddenly something clicked because correct people saw a synergy potential between the companies.

ByteLake: Absolutely, that's how we define luck in ByteLake. It's all about when opportunity meets preparedness. And then for the outside world is just luck.

Daniel: Absolutely.

ByteLake: It takes a lot of work to make this luck happen.

Daniel: It's all about the exposure and attention from the other side.

ByteLake: It is.

Daniel: Okay, brilliant. A couple of last questions: how are you going to encourage businesses to explore the use of AI?

ByteLake: Yeah, so I love that question and I always have a really straight answer to that – so just see the results that others achieved. For instance, a company that integrated Brainello has just increased the performance of their finance team by seven times. So if you want to try to beat them, then go ahead, but otherwise we highly encourage you to talk to ByteLake and explore what other things you can do better, differently, we'll tell you how, what, when. That's the long story short.

Daniel: It's a great example and I think, I mean I may be wrong, because I'm not really into that specific branch of tech industry, but I have that strange feeling that AI is not promoted as a solution yet, it's more promoted as the future. Do you see what I mean? It's more like: okay, we may use it in the future. But your results are tangible, there's actually something behind it and you make things work X times better, so my question is: why it's not advertised as a solution of today?

ByteLake: Yeah, I think it's a little bit like with IoT back in the days. When IoT concept popped up, although it was a very old concept, all of the sudden all of the companies became IoT companies. The same thing we observe with AI. AI popped up as a slogan which basically is more on the philosophy side than real knowledge and then all of the sudden every company in the world is an AI company, but as Andrew Ng said: AI is the new electricity. It will transform every industry in the world. That's a fact. Mariusz just mentioned the McKinsey report which just emphasized it on a larger scale and in terms of money. But people talk: we do AI, we implement AI, we incorporated AI, but what does it really mean? No one knows. And that's why we try to promote, and many other companies, it's not just ByteLake, you see the efforts that AI disappears from the marketing publications and people start talking about real life tangible results. We hear stores like updated systems with AI, we're able to detect pneumonia on a large scale annd with huge

accuracy. We hear stories that some software robots optimized logistics and helped with better planning. For business owners, for people that run their ventures, it all comes down to the question: will I become more efficient? Will it improve my ROI? On the long run, will it help me make better decisions? So that's the thing. AI is destined to become a kind of black box, but the real question is: which black box will we trust? And then the answer is that we just need to compare the results and see whether these black boxes are leading us towards greater achievements or not. It's evolution, right?

Daniel: Okay, but innovation and optimization comes with, I guess, a significant cost, not only for big companies, but mainly for small companies, the cost of implementing AI. Is it something that they can justify?

ByteLake: Cost is only one thing, but think of the opportunities you're losing. How much does it cost you of not having AI and that's is a completely different story and very interesting discussion.

Daniel: Okay, one last question to finish off. I use Amazon Alexa at home from time to time and she's not that smart yet, okay – let's put it this way, and I would like to understand your opinion about voice and voice-steered devices and the future of AI in that respect.

ByteLake: Okay, so maybe I will start about the future. AI can offload us in many areas. Unlike AI, people do not just rely on data, we use emotions, feelings, and we can process a lot of data and a lot of these under an incomparably smaller energy budget, so we are really far behind what interest you and there's a lot of work in front of us to compare our AI with our nature AI that we have in our brains. Regarding the voice thing, I need to ask Marcin about that, because he loves all those gadgets that we have currently on the market, so probably he's the right person.

ByteLake: The simple answer is that we're not there yet. Many people don't understand the difference between ninety-five or ninety-nine percent accuracy, but the real difference is that if we had ninety-nine percent accuracy, we would not need any other interface than voice. That would be just enough to build any system with voice and with those systems we are not there yet, but they are good enough for standard procedures like: "Alexa, play my playlist; Alexa play dance on radio" – I'm using it. It works, but I agree – if I ask some more complex questions like: "dim the lights in my living room" then sometimes it doesn't do all the things I need.

Daniel: Brilliant. Gentlemen, thank you very much for introduction of ByteLake, that's one thing, but also thanks for talking about augmented intelligence and the sophisticated terms which stand behind the human and computer interfacing, I guess. That's the main point I think. If you would summarize it, interactions between humans and machines, I think that's the key point here, this is what we are trying to develop.

ByteLake: Absolutely. That's where most of the research work goes. Look at different industries – it's all about supporting humans to help them process more data at the same time, remember more data at the same time and answer questions quickly. It's all about supporting, not replacing human.

Daniel: Marcin, Mariusz, thank you very much. It was a pleasure I wish you all the best at the Congress and yes, we will stay in touch and I will let you know when the episode is published, thank you very much.